



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/SE99/01586  (22) International Filing Date: 10 September 1999 (10.09.99)  (30) Priority Data: 09/160,625 24 September 1998 (24.09.98) US  (71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE).  (72) Inventor: <del>VO</del> Hanh, Duy; 2229 Laval, St-Laurent, Quebec H4L 2Z1 (CA).  (74) Agent: ERICSSON RADIO SYSTEMS AB; Common Patent Dept., S-164 80 Stockholm (SE).</p>		<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, <del>GB</del> GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> Without international search report and to be republished upon receipt of that report.</p>
<p>(54) Title: <u>SYSTEM AND METHOD FOR IDENTIFYING A CALLING PARTY</u></p> <p>(57) Abstract</p> <p>The present invention relates to a system and a method for providing a ringing tone indicative of calling party identification (32) to a mobile station (16) in a telecommunications network (10). The system has a subscriber database (12) that stores information on ringing tones to be used for the mobile station as a function of calling party identification. Upon receipt of an incoming call (64) at a switching node (14), the switching node obtains from the subscriber database the information on the ringing tone to be used, and sends the information on the ringing tone to be used to the mobile station. The information on ringing tones to be used for the mobile station is selected and stored by a mobile subscriber.</p> <div style="text-align: right;"> <p>choice of mod ring let em 2 chosen</p> <p>ring tone indicate calling ID</p> <p>10</p> <p>clms 1,5,7 page 10-2-10 page 10-26 to page 1-9</p> <p>P6-3-4 sending predetrmnd code to mobile. &amp; use fig 3B.</p> </div> <pre> graph TD     12[Subscriber Database 12] -- 20 --&gt; 14[Switching node 14]     14 -- 24 --&gt; 18((Base Station 18))     18 -- 22 --&gt; 14     18 -. 26 .-&gt; 16[Mobile Station 16]   </pre>		

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## SYSTEM AND METHOD FOR IDENTIFYING A CALLING PARTY

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**BACKGROUND OF THE INVENTION****Field of the Invention**

This invention relates to telecommunications networks and, more particularly, to a system and method for providing a ringing tone indicative of calling party identification to a mobile station.

**Description of Related Art**

With the venue of improved wireless telecommunications networks, it is now possible to obtain a wide variety of services. One of the services much appreciated, is the display of the calling party identification on a screen of a mobile station upon receipt of an incoming call. To really benefit from this service, the mobile subscriber needs to keep the mobile station at hand. Thus, whenever the mobile station rings, the mobile subscriber has to reach and pick up the mobile station in order to know who is calling and whether or not the call will be answered. However, this is not always possible and in certain occasions, such as when driving a car, it can even cause a dangerous situation.

Certain mobile station manufacturers offer an integrated memory in which the mobile subscriber can enter a list of calling party identifications, and determine different ringing tones to be applied thereto. Such a memory takes space, and with the newer generations of mobile stations, which keep becoming smaller, the space is scarce and memory is used only for essential features. Hence, the integrated memory for providing ringing tones as a function of calling party identifications is not desirable.

In order to overcome the disadvantage of existing solutions, it would be advantageous to have a system and method which would provide ringing tones

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indicative of calling party identification, while not requiring extra memory in the mobile station. The present invention provides such a system and method.

## SUMMARY OF THE INVENTION

5 In one aspect, the present invention is a system for providing a ringing tone indicative of calling party identification to a mobile station in a telecommunications network. The system comprises a subscriber database and a switching node. The subscriber database stores information on ringing tones to be used for the mobile station as a function of calling party identification. The switching node receives an  
10 incoming call that includes the calling party identification. The information on the ringing tone to be used is also sent from the subscriber database to the switching node. The switching node then sends appropriate ringing tone while alerting the mobile station.

5 Another preferred embodiment of the present invention relates to the corresponding method for providing a ringing tone indicative of the calling party identification to a mobile station in a telecommunications network. The method involves a step of storing in a subscriber database information on ringing tones to be used for the mobile station as a function of calling party identification. The method further comprises a step of receiving at a switching node an incoming call including  
10 the calling party identification. The next step of the method is to obtain from the subscriber database the information on the ringing tone to be used. Finally, the method also comprises a step of sending the information on the ringing tone to be used to the mobile station.

## BRIEF DESCRIPTION OF THE DRAWINGS

15 The invention will be better understood and its numerous objects and advantages will become more apparent to those skilled in the art by reference to the following drawings, in conjunction with the accompanying specification, in which:

0 FIGURE 1 is a block diagram of a portion of a telecommunications network according to a first embodiment of the invention;

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FIGURE 2 is a table of information of ringing tones to be used as a function of calling party identification according to the first embodiment of the present invention;

FIGURE 3A is a table of information of ringing tones to be used as a function of calling party identification stored in a subscriber database according to a variant of the first embodiment of the present invention;

FIGURE 3B is a table of predetermined codes and their corresponding ringing tone parameters stored in a mobile station according to a variant of the first embodiment of FIGURE 3A;

FIGURE 3C is a table of predetermined codes according to a variant of the preferred embodiment of the invention wherein the calling party Id is matched to preset melodies;

FIGURE 4 is a nodal operation and message flow diagram illustrating the first preferred embodiment of the present invention operation for providing a ringing tone indicative of the calling party identification;

FIGURE 5 is a block diagram of a portion of a telecommunications network in a WIN environment;

FIGURE 6 is a nodal operation and message flow diagram illustrating the method of providing a ringing tone indicative of the calling party identification, in a NON-WIN environment; and

FIGURE 7 is a nodal operation and message flow diagram illustrating the method of providing a ringing tone indicative of the calling party identification, in a WIN environment.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference is now made to FIGURE 1 where there is shown a block diagram of a portion of a telecommunications network 10. The telecommunications network 10 is a wireless network (also referred as a cellular telecommunications network). Figure 1 shows a first embodiment of the invention, wherein a subscriber database 12 keeps information on subscribers, such as services subscribed to. The

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telecommunications network 10 also includes a switching node 14, which switches and connects calls received from and directed to mobile station 16 through base station 18. It is understood that only one switching, node 14, base station 18 and mobile station 16 are shown, but that several switching nodes, base stations and mobile stations could also be involved, as known in the art. The subscriber database 12 is connected to the switching node 14 through a signalling link 20. The switching node 14 communicates with the base station 18 through a signaling link 22 and voice link 24 (in broken line). The base station 18 communicates with proximately located mobile station 16 through a radio link 26.

Several standards such as the (AMPS), (D-AMPS) and GSM may be used for the telecommunications network 10. In the AMPS and DAMPS standards, the subscriber database 12 is referred to as a Home Location Register (HLR), as well the subscriber database may be referred to as the home location register (HLR) and the service control point (SCP), while the switching node 14 is referred to as a Mobile Switching Center (MSC).

According to the first embodiment of the present invention, the telecommunications network 10 provides a ringing tone indicative of calling party identification to the mobile station 16. For doing so, the subscriber database 12 stores information on ringing tones to be used for the mobile station 16 as a function of calling party identification.

The switching node 14 receives an incoming call. The incoming call includes the calling party identification. Through the signaling link 20, the switching node obtains the information on the ringing tone to be used from the subscriber database 12. The information on the ringing tone to be used, obtained by the switching node 14, is sent to the mobile station 16 through the signaling link 22 and the radio link 26.

Referring now to FIGURE 2, there is shown a table of information of ringing tones to be used as a function of calling party identification according to the first embodiment of the present invention. For each mobile station having subscribed to the service of ringing tone indicative of calling party identification, the subscriber database 12 selects and stores information such as shown in table 30. The calling party identification and the corresponding ringing tone are selected and

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preferably entered by mobile subscribers. Typically, the calling party identification 32 is a 10 digits phone number. There is also included a value of calling party identification which corresponds to a no match situation 34 and which is identified as a default value.

5 For each calling party identification 32, there is provided information on the corresponding ringing tone 36. The ringing tone 36 is typically characterized by a period value 38, a pitch value 40 and a cadence value 42. The period value 38, also sometimes called duration value, indicates the number of cycle of cadence that will be repeated in a predetermined period of time. Usually, the period value 38 is  
10 equal to 1 cycle of cadence. The pitch value 40 indicates whether a medium pitch (which is normally the standard pitch), a high pitch or a low pitch are preferred. The cadence value 42 indicates the rhythm of the ringing tone. For example, the cadence value 42 could be equal to a 2-second pulse followed by a 4- second silence. Alternatively, the cadence value 42 could also be two pulses of 0.8  
15 seconds separated by a silence of 0.4 seconds and followed by a silence of 4 seconds. Finally, the cadence value could also be two pulses of one second, separated by a silence of 1 second and then followed by a silence of 3 seconds. The ringing tone information 36 could also comprise more elaborated parameters so as to imitate portions of well-known melodies, although this variant of the invention is  
20 not shown in FIGURE 2.

Referring now to FIGURES 3A and 313, there is respectively shown a table of information of ringing tones to be used as a function of calling party identification stored in a subscriber database 12. Also shown is a table of predetermined codes and their corresponding ringing tone parameters stored in a  
25 mobile station according to a variant of the first embodiment of the present invention. According to this variant of the first embodiment, the table 30 shown on FIGURE 2 is divided in 2 tables 50 and 52. Table 50 is stored in the subscriber database 12 while table 52 is stored in the mobile station. Table 50 includes the calling party identifications 32 selected and stored by the mobile subscriber. For  
30 each calling party identification 32, the mobile subscriber associates a

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predetermined code 54 which corresponds in the table 52 stored in the mobile station to ringing tone information 36.

Table 52 includes the predetermined code 54 and the corresponding ringing tone information 36. As previously described, the ringing tone information 36 may consist of parameters such as period value 38, pitch value 40 and cadence value 42, or any other type of ringing tone information. Thus, in this second variant of the first embodiment, the information sent from the subscriber database 12 to the mobile station 16 is only the predetermined code 54, instead of the period value 38, pitch value 40 and cadence value 42 used in the first variant of the first embodiment. Furthermore, it might be desirable for the mobile subscriber to associate preexisting ringing tones or melodies available in the mobile station 16 to the predetermined code 54 received from the subscriber database 12, instead of having to manually select the period value 38, the pitch value 40 and the cadence value 42.

Referring now to FIGURE 3C, there is shown a table of information of predetermines codes. Each of these codes is corresponding to ringing melodies stored in the mobile station, according to a variant of the invention.

Referring now to FIGURE 4, there is shown a nodal operation and message flow diagram illustrating the first embodiment of the invention. The nodes shown in diagram 60 are the switching node 14 and the subscriber database 12, and also involved is the mobile station 16. It should be noted that the base station 18 has been omitted from FIGURE 4 so as to simplify the drawing, but it is understood that all messages exchanged between the switching node 14 and the mobile station 16 transit through the base station 18. First, the calling party identification and the corresponding ringing tone information or predetermined code (as previously described with respect to FIGURES 2, 3A and 3B) are stored in the subscriber database 12 via administrative procedures. These procedures may involve an operator programming the ringing parameters as demanded by the subscriber, or an automatic interface allowing the subscriber to enter the ringing parameters for each caller.

Upon receipt of an incoming call 64 in the switching node 14, a 10 Location Request Message 66 is sent from the switching node 14 to the subscriber database 12.



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If the incoming call 64 includes calling party information, the calling party information is sent in the **Location Request Message 66**. Such a Location Request Message 66 may be sent in ANSI-41 standard in order to obtain from the subscriber database 12 information on the services subscribed to by the mobile subscriber and to obtain location information stored. However, any similar message in any appropriate standard could also be used to perform the same task. Upon receipt of the Location Request Message 66, the subscriber database 12 identifies the subscriber services (ACTION 68). A verification of appropriate ringing tone information is performed in the subscriber database (ACTION 70), as a function of the calling party identification received from the switching node 14. If no calling party identification is detected in the Location Request Message 66, the subscriber database 12 uses the default value. Then, a Location Request Result Message 72, including the appropriate ringing tone information is sent to the switching node 14. After reception of the Location Request Return Result message, the call may be delivered from the gateway MSC to the serving switching node 14. The mobile station 16 is then paged and alerted (ACTION 74) with the ringing tone information received previously. The message 74 preferably is an IS136 standard message, but any similar message having a different format may be used as well. Upon receipt of the message 74, the mobile station 16 rings (ACTION 77) with a ringing indicative of the calling party identity.

Reference is now made to FIGURE 5, which shows a block diagram of a portion of the telecommunications network 10 in accordance with the second preferred embodiment of the present invention. In that second embodiment, the telecommunications network 10 includes the subscriber database 12 and a service control point 13, which contains and executes certain intelligent logics for WIN services for mobile stations, in co-operation with the subscriber database 12. The telecommunications network 10 also includes a gateway/originating switching node 15, which switches and connects calls received to an appropriate serving switching node 14. As previously described, the serving switching node directs the calls to the mobile station 16 through base station 18. It is understood that only one serving switching node 14, base station 18 and mobile station 16 are shown, but that several

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switching nodes, base stations and mobile stations could also be involved, as known in the art.

The gateway/originating switching node 15 is connected to the switching node 14 through a trunk link 23, and is also connected to the subscriber database 12 through a signaling link 19.

According to the second preferred embodiment of the present invention which defines the invention in a WIN environment, the telecommunications network 10 provides a ringing tone indicative of calling party identification to the mobile station 16. For doing so, the Service Control Point 13 stores information on ringing tones to be used for the mobile station 16 as a function of calling party identification, and the service control point 13 has necessary logic to execute certain services, such as the present invention.

Referring now to FIGURE 5, the gateway/originating switching node 15 receives an incoming call 64. The incoming call 64 includes the calling party identification. The location request is performed through the signaling link 19, while the routing request is performed via the signalling link 20. Once the call is delivered to the serving MSC 14, the ringing tone information is obtained through the signalling link 27 and is sent to the mobile station 16 through the signaling link 22 and the radio link 26.

Figure 6 is a nodal operation and message flow diagram that illustrates the detailed version of the preferred embodiment of the invention in a NON-WIN environment. This is a more detailed diagram than the one presented in FIGURE 4. When a call is placed, a LOCREQ message 66 is directed to the Subscriber database 12, which identifies the subscriber services of the called party (ACTION 68). Then, a SERVREQ message is sent by the subscriber database 12 to the service control point 13 for requesting the distinctive ringing parameters corresponding to the calling party. The service control point detects these parameters (ACTION 70) in the tables 30 or 50 and returns this information through SERVREQ answer 71 to the subscriber database 12. Upon receipt of the ringing tone information, the subscriber database 12 forwards it to the serving MSC, as shown in FIGURE 6, through AMON 73. The serving MSC answers with

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a Routreq Response message to the subscriber database 12, which in turn sends a Locreq Response message 72 to the gateway MSC. The call 64 is delivered (ACTION 75) to the serving MSC which alerts the mobile station 16 with the distinctive ringing corresponding to the caller party (ACTION 74).

5           Figure 7 is a nodal operation and message flow diagram that illustrates the detailed version of the preferred embodiment of the invention in a WIN environment.

10           When a call is placed, a LOCREQ message 66 is directed to the subscriber database 12, which identifies the subscriber services of the called party (ACTION 68). Then, the subscriber database 12 sends a ROUTREQ message to the serving MSC, which answers with a routreq answer 76. A locreq answer is then sent from the subscriber database 12 to the gateway MSC (ACTION 72). The call is then delivered from the gateway MSC 15 to the serving MSC 14 (ACTION 75). Upon receipt of the call delivery message 75, if the called subscriber is WIN-capable, the serving MSC  
15           launches a FAVAEL message 78 to the service control point 13 for requesting the distinctive ringing tone information. The SCP 13 determines the right ringing tone information to be sent according to the calling party ID received (ACTION 70), and returns it to the serving MSC 14 through a FAVAIL response 80. Finally, the mobile station 16 is alerted (ACTION 74) using the distinctive ringing tone that correspond  
20           to the current calling party. It is thus believed that the operation and construction of the present invention will be apparent from the foregoing description. While the method and system shown and described has been characterized as being preferred, it will be readily apparent that various changes and modifications could be made therein without departing from the spirit and scope of the invention as defined in the following  
25           claims.

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**WHAT IS CLAIMED IS:**

1. A system for providing a ringing tone indicative of calling party identification to a mobile station in a telecommunications network, the system comprising:

5 a subscriber database storing information on ringing tones to be used for the mobile station as a function of calling party identification; and

a switching node for receiving an incoming call including the calling party identification, the switching node obtaining from the subscriber database the information on the ringing tone to be used, and

10 sending the information on the ringing tone to be used to the mobile station.

2. The system for providing a ringing tone indicative of calling party identification to a mobile station of claim 1, wherein the information on ringing tones to be used stored in the subscriber database is selected by a mobile subscriber.

15 3. The system for providing a ringing tone indicative of calling party identification to a mobile station of claim 1, wherein:

the subscriber database is a Home Location Register (HLR); and

the switching node is a Mobile Switching Center (MSC).

20 4. The system for providing a ringing tone indicative of calling party identification to a mobile station of claim 3, wherein the subscriber database further comprises a service control point (SCP) for storing and providing ringing tone information associated with predefined calling parties.

25 5. The system for providing a ringing tone indicative of calling party identification to a mobile station of claim 1, wherein the information on the ringing tone to be used is sent from the switching node to the mobile station.

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6. The system for providing a ringing tone indicative of calling party identification to a mobile station of claim 5, wherein the information on the ringing tone to be used comprises pitch, cadence and duration.

5 7. The system for providing a ringing tone indicative of calling party identification to a mobile station of claim 5, wherein:  
the information on the ringing tone to be used is a predetermined code; and  
the mobile station further comprises a table indicating for the predetermined code corresponding pitch, cadence and duration.

10 8. The system for providing a ringing tone indicative of calling party identification to a mobile station of claim 1, wherein the subscriber database has a default value of ringing tone for undefined calling party identifications.

15 9. A method for providing a ringing tone indicative of calling party identification to a mobile station in a telecommunications network, the method comprising steps of:  
storing in a subscriber database information on ringing tones to be used for the mobile station as a function of calling party identification;  
20 receiving at a switching node an incoming call including the calling party identification;  
obtaining from the subscriber database the information on the ringing tone to be used; and

15 sending the information on the ringing tone to be used to the mobile station.

10 10. The method for providing a ringing tone indicative of calling party identification to a mobile station of claim 9, wherein the step of storing the information on ringing tones to be used is performed by a mobile subscriber.

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11. The method for providing a ringing tone indicative of calling party identification to a mobile station of claim 9, wherein:

the subscriber database is a Home Location Register (HLR); and  
the switching node is a Mobile Switching Centre (MSC).

5

12. The method for providing a ringing tone indicative of calling party identification to a mobile station of claim 11, wherein the subscriber database further comprises a service control point (SCP).

10

13. The method for providing a ringing tone indicative of calling party identification to a mobile station of claim 9, wherein the step of sending the information on the ringing tone to be used comprises sending said information from the switching node to the mobile station.

15

14. The method for providing a ringing tone indicative of calling party identification to a mobile station of claim 13, wherein information on the ringing tone to be used comprises pitch, cadence and duration.

20

15. The method for providing a ringing tone indicative of calling party identification to a mobile station of claim 13 wherein:  
the information on the ringing tone to be used is a predetermined code; and

the method further comprises steps of:

25

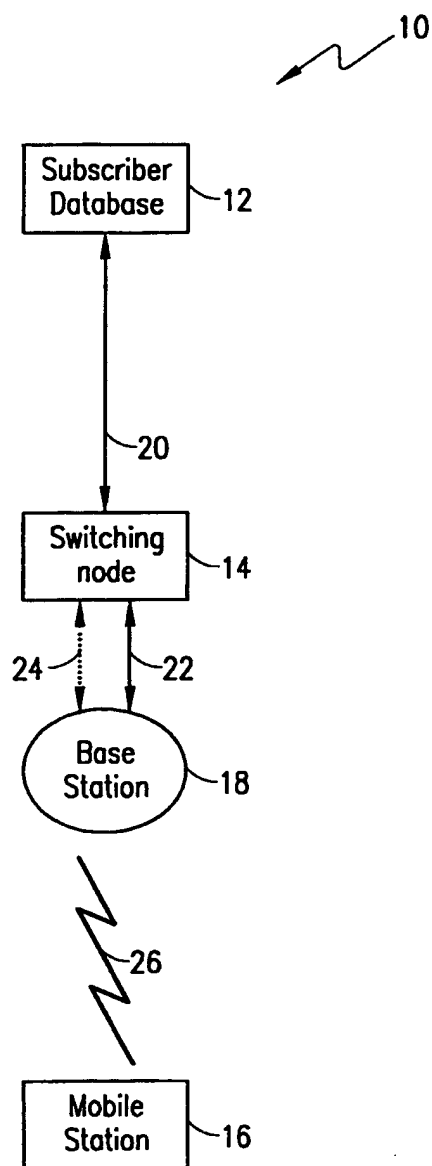
storing in the mobile station further a table indicating for the predetermined code corresponding pitch, cadence and duration; and

upon receipt of the information on the ringing tone at the mobile station, consulting the table to obtain the pitch, cadence and duration to be used.

30

16. The method for providing a ringing tone indicative of calling party identification to a mobile station of claim 15, wherein the subscriber database has a default value of ringing tone for undefined calling party identifications.

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**FIG. 1**

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30 *Table*

36			
32 Calling Party Id	38 Period	40 Pitch	42 Cadence
No match	1	Medium	Pulse 2sec, Silence 4 sec
(514) 345-7900	1	High	Pulse 0.8 sec, Silence 4 sec, pulse 0.8 sec, silence 4 sec
(905) 123-4567	1	Low	pulse 1 sec, silence 1 sec, pulse 1 sec, silence 3 sec

34

FIG. 2

32 Calling Party Id	54 Predetermined code
No match	0
(514) 345-7900	1
(905) 123-4567	2

*Received* 50

FIG. 3A

*Ring tone information*

36			
54 Pred. Code	38 Period	40 Pitch	42 Cadence
0	1	Medium	Pulse 2 sec, Silence 4 sec
1	1	High	Pulse 0.8 sec, Silence 0.4 sec, Pulse 0.8 sec, Silence 4 sec
2	1	Low	Pulse 1 sec, Silence 1 sec, Pulse 1 sec, Silence 3 sec

52 *in mobile*

FIG. 3B

*in mobile station (summary, page 3)*

0	Melody 1
1	Melody 2
2	Melody 3

FIG. 3C



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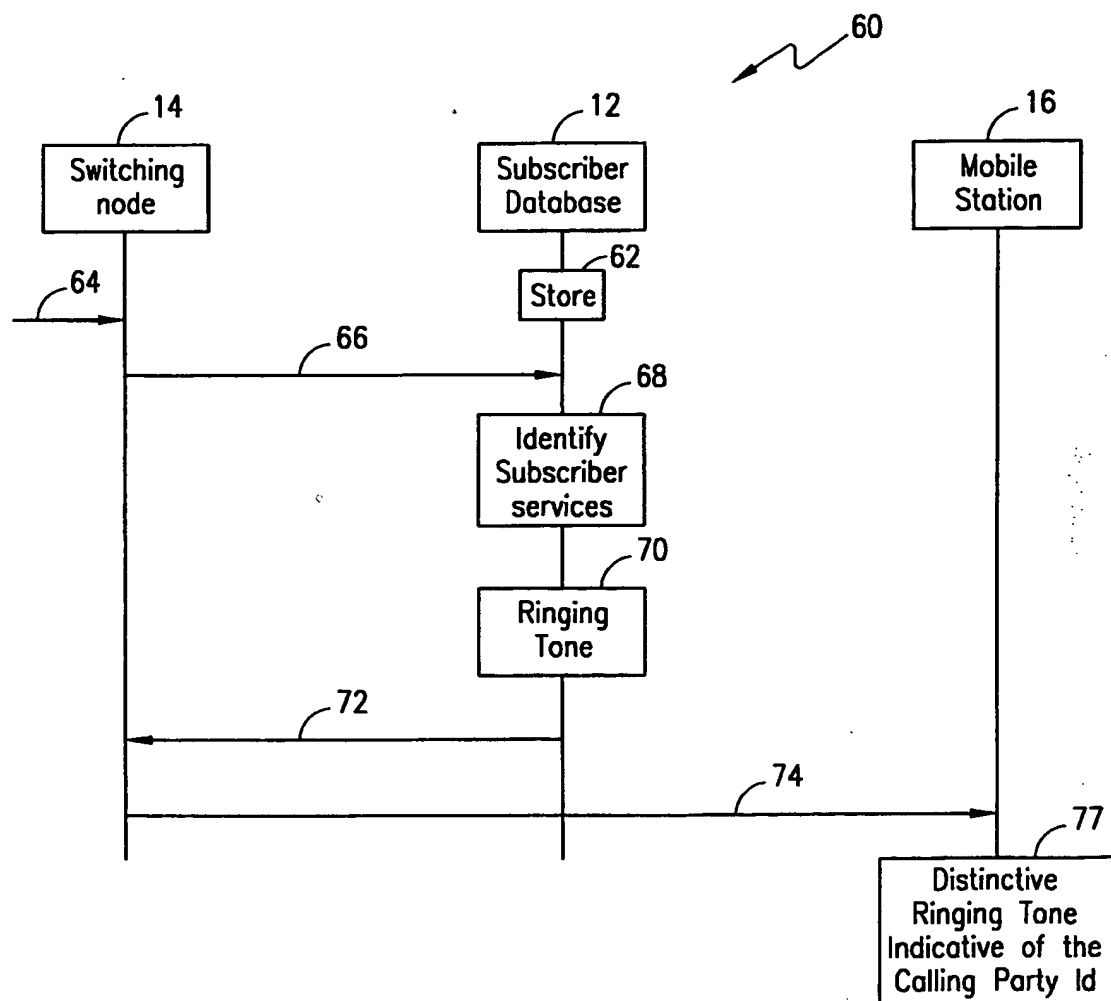
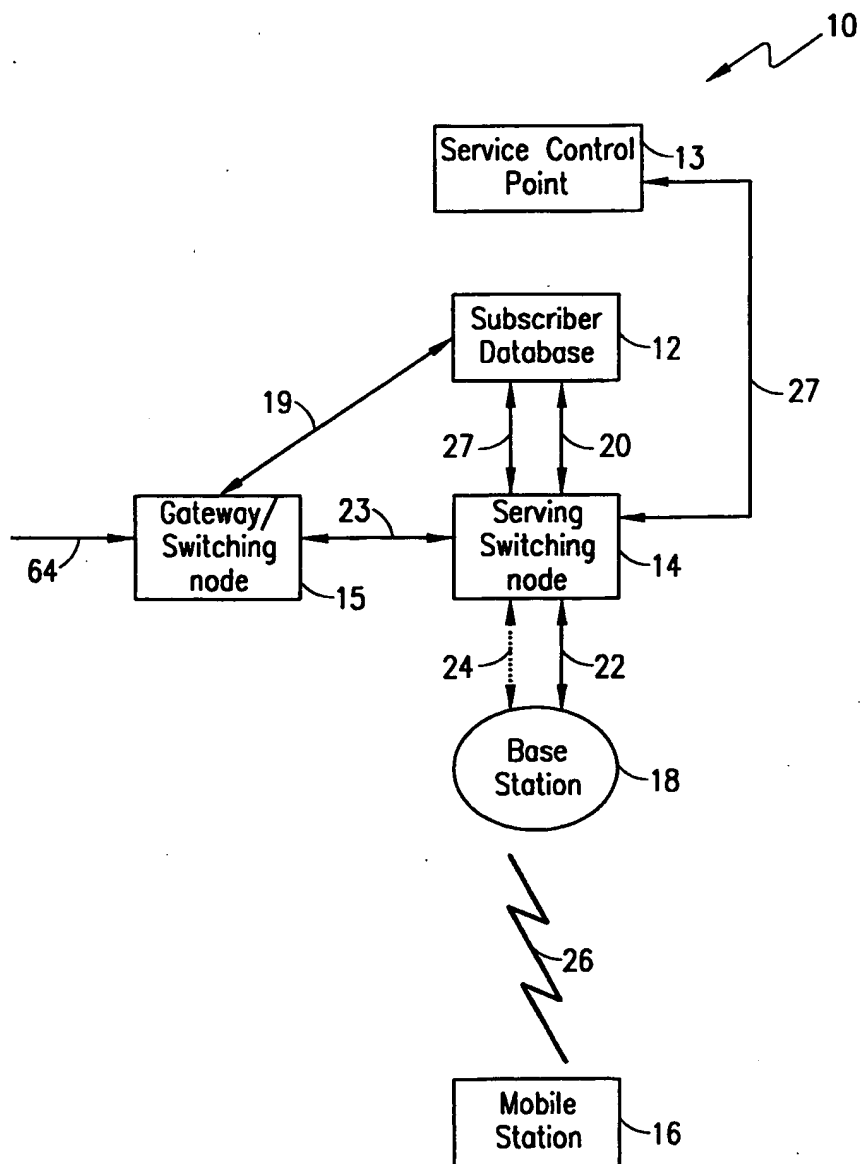


FIG. 4

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**FIG. 5**

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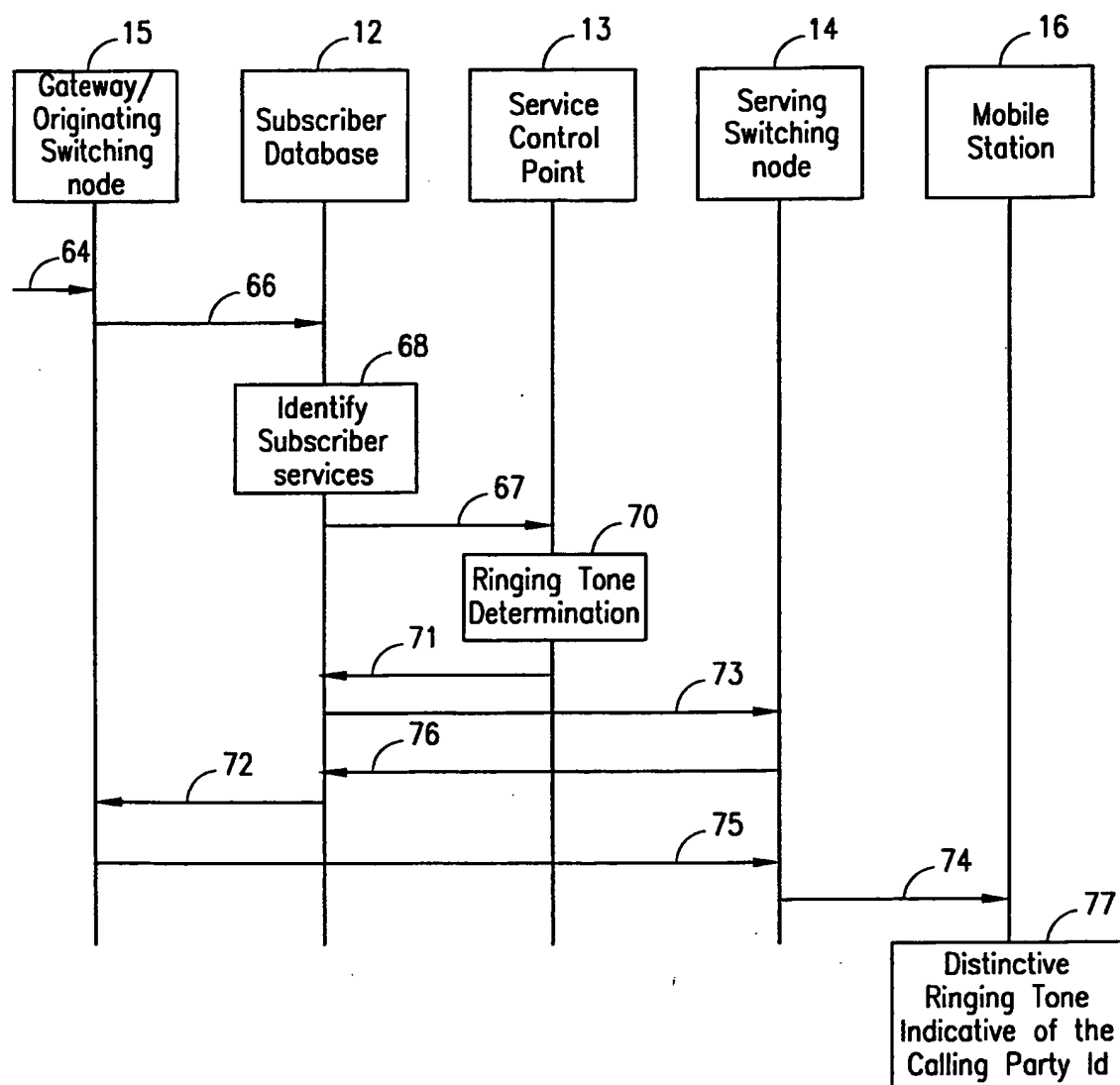


FIG. 6

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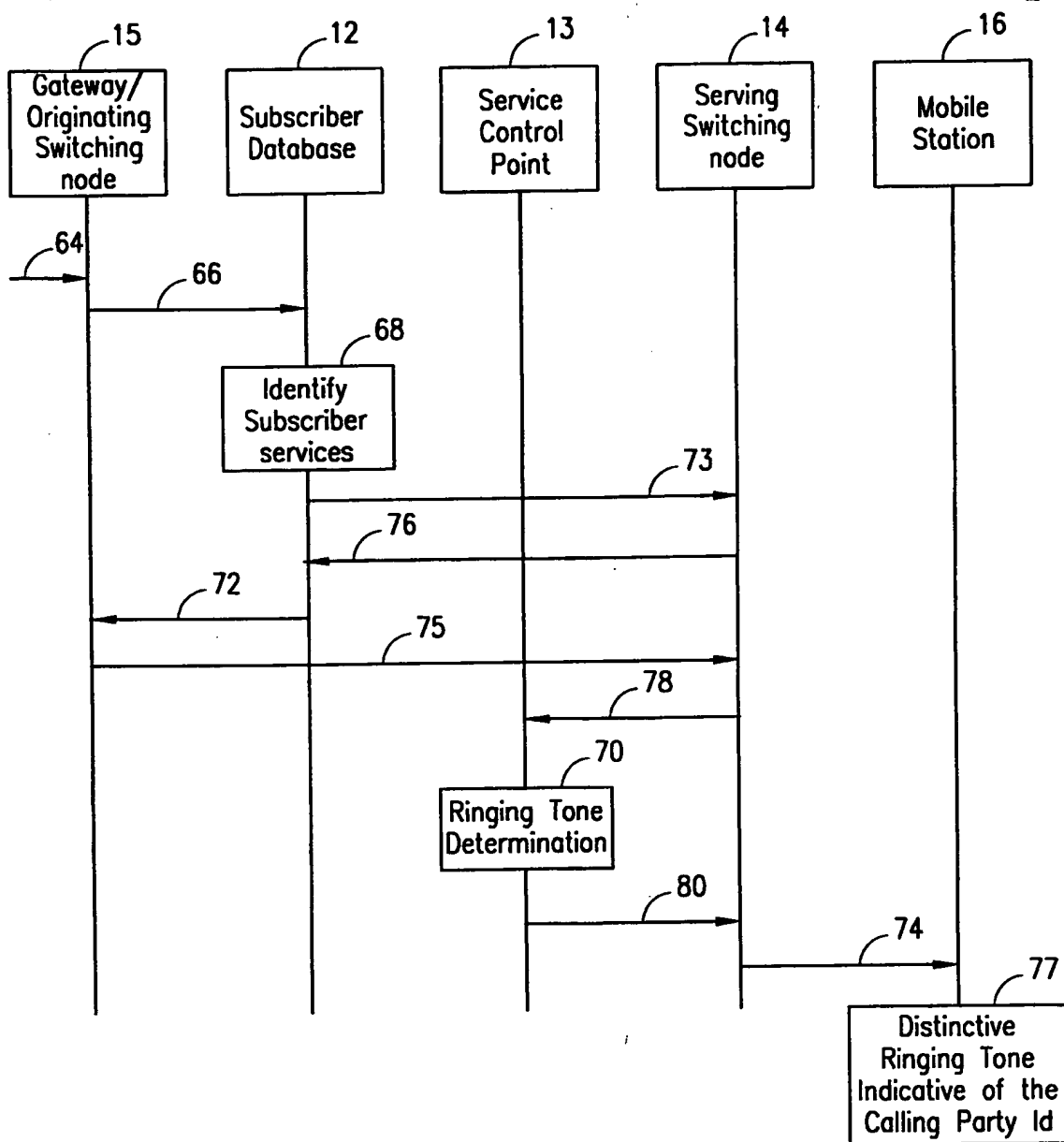


FIG. 7